Uses of Hydrocarbons

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Hydrocarbons are organic compounds containing hydrogen and carbon.

Based on the carbon – carbon bonds, they can be classified as Alkanes, Alkenes and Alkynes.

Saturated hydrocarbons are the simplest form of hydrocarbon species.

They are composed of single bonds and are saturated with hydrogen. Those with exactly one cyclic ring are cycloalkanes.

Unsaturated hydrocarbons are hydrocarbons with double or triple bonds between carbon atoms.

Alkanes are acyclic saturated hydrocarbons where all carbon – to – carbon bonds are single.

Cycloalkanes are saturated hydrocarbons which are monocyclic or polycyclic. One group of higher alkanes are waxes. The alkanes have two main commercial sources; Petroleum (crude oil) and natural gas.

Alkanes experience intermolecular van-der-waals forces. Stronger intermolecular van-der-waals forces give rise to greater boiling points of alkanes.

Alkenes are unsaturated hydrocarbons , that contains one carbon – carbon double bond. The physical state of alkenes depends on molecular mass; the simplest alkenes are ethene , propene and butene are gases at room temperature.

Linear alkenes of approximately five to sixteen carbon are liquids, and higher alkenes are waxy solids.

Simplest alkenes are important components of polystyrene and polyvinyl chloride(PVC), which are polymers.

Hydration is the addition of water across double bond of alkenes, yields alcohols. The reaction is catalysed by strong acids such as sulfuric acid. This reaction can be carried out at industrial scale to produce ethanol.

Ethylene is used to ripen fruits and vegetables.

Synthetic alkene polymers find biomedical use in laboratories.

Alkyl group is associated with symbol R, that is; it could be connected cyclically as methyl or ethyl groups.

Metal Complexation – Alkenes are ligands in transition metal alkene complexes. They are also chelating agents(metal catalysed reaction).

Alkenes are produced by hydrocarbon cracking.

Chiral saturated hydrocarbons constitute sidechains of biomolecules ; such as chlorophyll or Tocopherol.

Chirality is a geometric property of some molecules and ions. A chiral molecule / ion is non-superimposable on its mirror image.

Aromatic hydrocarbons are called Arenes; that have at least one aromatic ring.

Hydrocarbons like Paraffin wax and Napthalene are low melting solids.

Dehydrohalogenation reaction are the elimination reaction of alkyl halides and alcohols.

Dehydration of alcohols produces alkenes.

Alkenes can also be prepared by Alkyl amines.

Alkynes are unsaturated hydrocarbons containing at least one carbon-carbon triple bonds. The simplest acyclic alkynes contain only one triple bond and no other functional group.

Alkynes are traditionally known as acetylenes (ethyne).

Commercially dominant alkyne is Acetylene itself; which is used as fuel and a precursor to other compounds; eg. Acrylates. It can be produced by partial oxidation of natural gas.

Acetylene is commercially dominant alkyne, can be produced by partial oxidation of natural gas.

Isolation of acetylene is possible from natural sources such as. Plant species, marine sponges, bacteria and fungi.

Acetylene is colourless and widely used as fuel.

Acetylene can alternatively be produced by hydrolysis of calcium carbide.

Calcium carbide production requires extremely higher temperatures, can be used in hydroelectric power.

At atmospheric pressure, Acetylene can not exist as a liquid and does not have melting point.

The triple point on the phase diagram corresponds to the melting point at minimal pressure at which liquid acetylene can exist. At temperatures below the triple point, the solid acetylene can change to vapour by Sublimation.

At room temperature, the solubility of acetylene in acetone is 27.9 g per kg.

The solvents like acetone are used in pressurised gas cylinders.

Industrial uses of Acetylene

- ➔ **Welding**
- ➔ **Portable lighting**
- ➔ **Can be semihydrogenated to ethylene for various polyethylene products.**

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